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ZOOLOGY.

The German Zoological Society.—The annual report of this society for 1892 is out, and contains among others the following papers: The opening address by the President, Professor F. E. Schultze, described the zoological department of the University of Berlin, where the meeting was held, giving also a sketch of its history. Professor H. E. Ziegler spoke upon the embryonal anlage of the blood in the vertebrates. At first the blood is a clear serum in which no corpuscles appear. Later they are present. Various ideas have been advanced as to their origin. Ziegler vigorously discusses the view which assigns them to the entoderm and decides that they are without doubt mesodermal in origin. Dr. L. Plate described the anatomy and affinities of the Onchidiidæ. These forms belong to the Asiatic region, and are amphibious, living equally well in or out of the salt water. To separate the genera the author uses the relative width of the foot and of that suprapedal region to which he gives the name of hyponotum. The group is of great interest from the fact that though usually regarded as Opisthobranchs they must be considered as near the ancestral Pulmonate. Plate, however, thinks that they have crossed the line and are true Pulmonates, but that their Nudibranch characters are such as cannot be explained except upon the hypothesis of descent from that group. Dr. Thiele, in discussing the phylogeny of the byssus apparatus of the Lamellibranchs, thinks that it must be traced back to some such type as the adhesive glands of Haliotis, and does not agree with Pelseneer in regarding the byssal glands of the Nuculidæ as the most primitive. The fact that either in young or in adult the byssus occurs in most Acephals, is proof to Thiele that the gland must be traced back to the ancestral mollusc. Von Nathusius discussed the form and color of the hair as a basis of classification of the Equidæ. Dr. Korschelt presented a paper on the differentiation of the germ-layers in the Cephalopods with especial reference to the formation of the alimentary canal and the nervous system. According to Bobretzky both the midgut and the nervous system are of mesodermal origin, while several other authors think that the whole alimentary canal is formed by ectodermal inpushings (stomo- and proctodeum). Korschelt finds[1] that at an early date an epithelial layer arises just above the yolk in the anal region. It is distinctly separated from the ectoderm by the mesoderm. Later it becomes elevated from the yolk, forming a small cavity open to the yolk, the future mesenteron. This layer is regarded by Korschelt as entoderm, and has been regarded by several authors as the proctodeal inpushing. He also finds the nervous system to be, as might have been expected, ectodermal. Dr. Burckhardt described the central nervous system of the Dipnoi. He has subjected the brain to sections, and by study of these has been able to elucidate points not before understood. He concludes that in its brain Protopterus is not an Amphibian, but that it is in this respect a problematic organism between the fishes (Elasmobranchs) and Amphibia, whose exact position will first be solved when the ontogeny is studied. Professor R. Hertwig had a review of recent work upon canjugation and fertilization, and Dr. H. H. Field a paper on the Metamerism of the Kidney of Amphiuma, already noticed in our pages. The last paper was a view of the idea of instinct, by Professor H. E. Ziegler.

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[1] The full paper with illustrations appears in the Leuckart Festschrift.

Eyes of Polychætes.—Dr. E. A. Andrews has an extended article[2] on this subject. He has studied a large series of genera, some both as young and adult, and among the conclusions at which he arrives are the following: The eye is an epidermal organ consisting of a pigmented cup containing a refracting mass, which at the orifice of the cup comes in contact with the cuticle. The wall of the cup consists of a single layer of cells forming the retina, each retinal element containing pigment, and being produced internally into a nerve process, externally into a clear rod. This, as will be seen, is a different conception of the annelid eye from either that of Carrière or that of Graber, but one which approaches most nearly to that of the former author.

Arachnida.—Mr. B. I. Pocock discusses[3] the external anatomy of the members of the group Arachnida (*s. s.*), and concludes that the members must be arranged in two sub-classes, Ctenophora, with the single order Scorpiones, and Lipoctena, containing the superorders Caulogastra (Pedipalpi and Araneæ) Mycetophora (Solifugæ), and Holostomata (Pseudoscorpiones, Opiliones, Acari).

F. Purcell, after studying the anatomy and development of the eyes of *Liobunum hemisphæricum*, concludes[4] that contrary to the com-

[2] Jour. Morph., vii, 169, 1892.

[3] Ann. and Mag. Nat. Hist., VI, xi, p. 1, 1893.

[4] Zool. Anz., xv, 1892.

monly accepted ideas, these organs in the Phalangids are to be regarded as compound, and further that they are inverse eyes homologous with the anterior middle eyes of spiders and the middle eyes of the scorpions.

The Fishes of the Pacific Coast of America North of Cerros Islands.—An important paper recently published is an enumeration of the fishes occurring on the Pacific coast of America north of Cerros Island, and to a depth of 150 fathoms by C. H. and R. S. Eigenmann. The authors have placed the dividing line between the littoral and the bathybial faunas of this region at 150 fathoms, because all of the genera so far recorded from this depth have representatives in the shallower water. The few littoral genera which have representatives in deeper water are added as footnotes. Cerros Island is a natural boundary to this region, since south of it few of the characteristic genera of this region are found. The author's observations show that the old division, at Point Conception, of the northern and southern California fauna is incorrect, and that, in reality, no definite boundaries can be assigned for a northern and southern fauna.

The California fauna is distinct from that of Alaska, although four of the species found at San Diego are found in Alaska. The California Fauna is characterized by the abundance of species of Sebastodes, of Cottidæ, and of Embiotocidæ. The last are entirely absent from Alaska, and only a few species of Sebastodes are found there. The boundary between these two regions lies somewhere between Sitka and Puget Sound.

The relative number of species at the principal localities is as follows:

	Species.
The whole of Alaska	108
Puget Sound	107
San Francisco	156
Monterey	148
Santa Barbara	117
San Pedro	82
San Diego, including Cortes Banks	168

There are known from the entire region 382 species, belonging to 228 genera. Of these 116 genera, or more than half, are also found in the Atlantic Ocean, and 32 species are found both in the Atlantic and in the Pacific.

The genera having species in both oceans practically all belong to one of three classes: 1st, Tropical genera; 2d, Arctic genera; 3d, Pelagic and other genera (Ann. N. Y. Acad. Sci., vi, 1892).

On the Mechanical Genesis of the Scales of Fishes.—Mr. J. A. Ryder has advanced a theory that the genesis and arrangement of the scales of fishes is due to the movements of the fishes in swimming. The scales originate in a continuous subepidermal matrix which may be regarded as a basement membrane. Such a matrix is found to actually exist in some forms at an early stage, just beneath the epidermis; in other forms it exists in the larval stages, and in the young of many types of fishes it is coextensive with the whole epidermal layer just at the time when the scales are forming.

In the Clupeoids and Cyprinoids it is found that the myocommata, or sheets of connective tissue intervening between successive somites are attached firmly to the deeper layers of the skin. This construction, together with the peculiar arrangement of the muscle plates at the time the scales begin to form, conditions the further growth of the scale matrix. The ordinary movements of the fish in swimming throw the whole integument into definitely circumscribed areolæ, of which the central portions are in a quiescent state, while the margins are wrinkled or folded as a result of the current action of the lateral muscles of the body.

In each of the circumscribed areolæ a scale develops; the continuity of its development with its fellows across the margins of the areola is prevented by the flexures to which the dermis is there subjected.

The author shows that the imbrication as well as the arrangement of the scales is determined by the action of the segmentally arranged muscles of the body.

Special types of squamation, as those of the eel and the sturgeon, confirm the author's views. In cases where the scales are very fine, that is, several oblique rows corresponding to each somite, the principle holds good, since the rows still conform to the lines of tension of the linear attachment of the myocommata to the integuments.

From the hypothesis and the evidence presented, Mr. Ryder draws the following important conclusion:

1. "The scales of fishes bear a segmental relation to the remaining hard and soft parts, and are either repeated consecutively and in oblique rows corresponding to the number of segments, or they may be repeated in rows as multiples of the somites, or segmental reduction may occur, which may affect the arrangement of the scales so as to

reduce the number of rows below the number of somites indicated by the other soft and hard parts.

2. "The peculiar manner of interdigitation of the muscular somites as indicated by the sigmoid outline of the myocommata, as seen from their outer faces, and the oblique direction of the membranes separating the muscular cones, has developed a mode of insertion of the myocommata upon the corium which has thrown the integument into rhombic areolæ during muscular contraction. These areolæ are in line in three directions, and the folds separating them, particularly at their posterior borders, are inflected in such a manner by muscular tensions, due to the arrangement of muscular cones, as to induce the condition of imbrication so characteristic of the squamation of many fishes."—(Proceeds. Phila. Acad., Part II, 1892.)

The Systematic Position of the Kiwi.—In a paper on the History of the Kiwi, Professor T. Jeffery Parker gives the following conclusion as to the systematic position of this species:

"On the whole it will be seen that the study of the development of the kiwi tends to lessen the gulf between it and ordinary birds, and to show that its ancestors probably possessed many of the more important and distinctive features which characterize the Carinatæ of to-day. The facts clearly indicate that the founder of the Apterygian house had interrupted plumage, functional wings, an ordinary avian tail, a keeled sternum, a double-headed quadrate, lateral optic lobes, and a pecten in the eye; in other words, that the ancestors of the genus were typical flying birds and not bird-like reptiles.

"Of the eight characters enumerated above as separating the Ratitæ from the Carinatæ it will be noticed that the first five are directly connected with the power of flight. We should expect to find such adaptive characters in purely cursorial birds whether they arose from a common stock or sprang separately from early flying birds, and as a matter of fact they occur to a greater or less extent in such flightless birds as the Dodo, Weka, Notornis, etc., which we know have no genetic connection with one another, but have independently acquired the characteristics of flightlessness. I think, therefore, that the possession of the characters referred to by the whole of the Ratitæ is no argument for their common origin.

"The peculiarity of the quadrate has been shown to be a secondary matter, and we have left only the characters of the base of the skull. These certainly form an excellent diagnostic character by which the whole of the Ratitæ are separated from the majority of the Carinatæ, but even here the distinction is not absolute, for the Tinamous approach in many respects more nearly to the Ratitæ than to the rest of the Carinatæ. Still it seems probable that the various genera of Ratitæ must have diverged from the main line of descent at a comparatively early period, though perhaps not earlier than some of the existing orders of Carinatæ. The Penguins, for instance, are far more reptilian in their vertebral column and less typical in the structure of their wings than the Ratitæ. The Ostrich, however, shows the unique and very reptilian character of two claws on the wing, and the very general presence of wing-claws in the group is a distinctly primitive character.

"Leaving the skull, in which the whole group shows primitive characters, and the wing and related parts, in which the resemblances between the genera are largely adaptive, we find the range of variation in the Ratitæ to be very great indeed. Two genera (Apteryx and Dinornis) have a normal four-toed foot; in three others (Cassowary, Emu and Rhea) the hind toe or hallux has disappeared; while in another (Ostrich) only two toes are left. The pelvis of the kiwi and moa is of the simplest avian type, both pubis and ischia being free; in the cassowary and emu the ischium unites with the ilium; in the rhea the ischiæ unite with one another above the intestines—a unique arrangement; in the ostrich the pubes unite to form a symphysis as in most of the higher vertebrates. The feathers have an aftershaft in the emu, cassowary, and moa, none in the ostrich, rhea, or kiwi. In no order of carinate birds do we find such a wide range of variation as this, and when we add to the characters enumerated the extraordinarily aberrant skull and the structure of the egg shell of the Apteryx, the total atrophy of the wings in Dinornis, and even of the shoulder-girdle in some species of the genus, and the striking differences between the sterna, the shoulder-girdle and the wings of the various genera, we are forced to the conclusion that the existing or lately extinct cursorial birds now known to us are divisible into five well-marked orders, each the equivalent of an entire order of Carinatæ. Of these one order contains the ostrich alone, another the rheas, a third the emu and the cassowaries, a fourth the moas, and a fifth the kiwis.

"As to the relation of the kiwi to the other genera it has been shown to be most nearly allied, as far as its skeleton is concerned, to the moa, differing from it, however, in many important respects. It must certainly have been isolated at a very distant period, and as far as we can see, some of its more striking peculiarities are distinctly correlated to its method of feeding. Most nocturnal animals have large eyes suited for taking the utmost advantage of the semi-darkness, but the kiwi, finding its prey by scent alone, has developed an extraordinarily perfect olfactory sense, while at the same time, having no need to keep watch against beasts of prey, its eyes have diminished in size and efficiency to a degree elsewhere unknown in the bird class."—(New Zealand Jour. Sci., March, 1891.)

Mammals from the Galapagos Islands.—The mammals collected by Dr. Baur on the Salisbury Expedition to the Galapagos Islands were sent to Mr. J. A. Allen for identification. The collection numbers 12 specimens, representing 4 species, of which 2 prove to be introduced species of *Mus.* The other species are both new, one a bat, *Atalapha brachyotis,* the other a mouse, *Oryzomys baurii,* closely related to *O. galapagœnsis.* The only other species of mammals thus far reported from the Galapagos Islands are two species of Eared Seals, *Otaria jubata* (Forst.) and *Arctocephalus australis* (Zimm.), which were obtained by the Hassler Expedition. The list of known indigenous species thus numbers only five.—(Bull. Am. Mus. Nat. Hist., Vol. iv.)